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(54) Abstract Title

Controlling a mobile telephone in a designated area

(57) The functionality of a mobile phone may be restricted in designated areas. The mobile telephone may receive a locally generated signal to determine it is in such an area, have an on board GPS receiver or alternatively measure the time of arrival of a signal from a number of base stations. A two tier system may be operated so that in highly sensitive areas the mobile telephone is disabled, but in areas of lower sensitivity only certain functions, for example audible alerts, are inhibited.

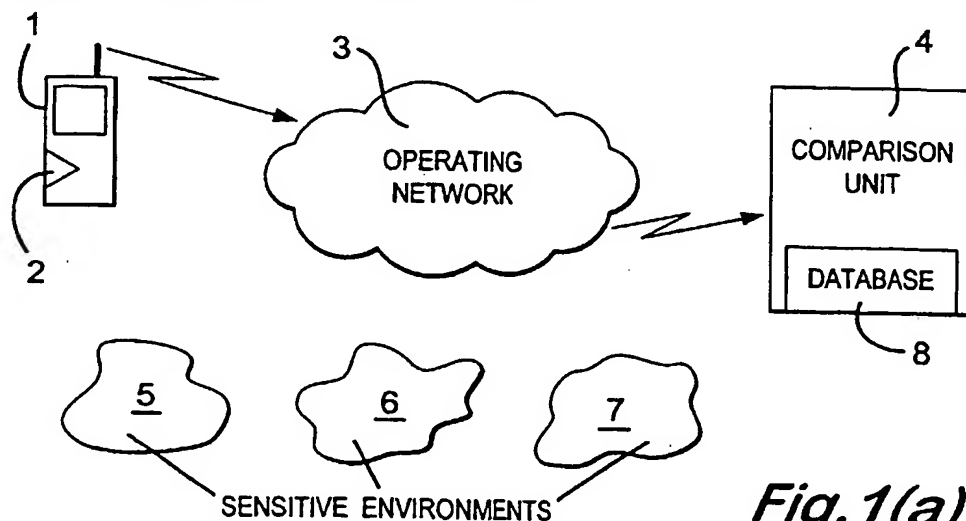


Fig. 1(a)

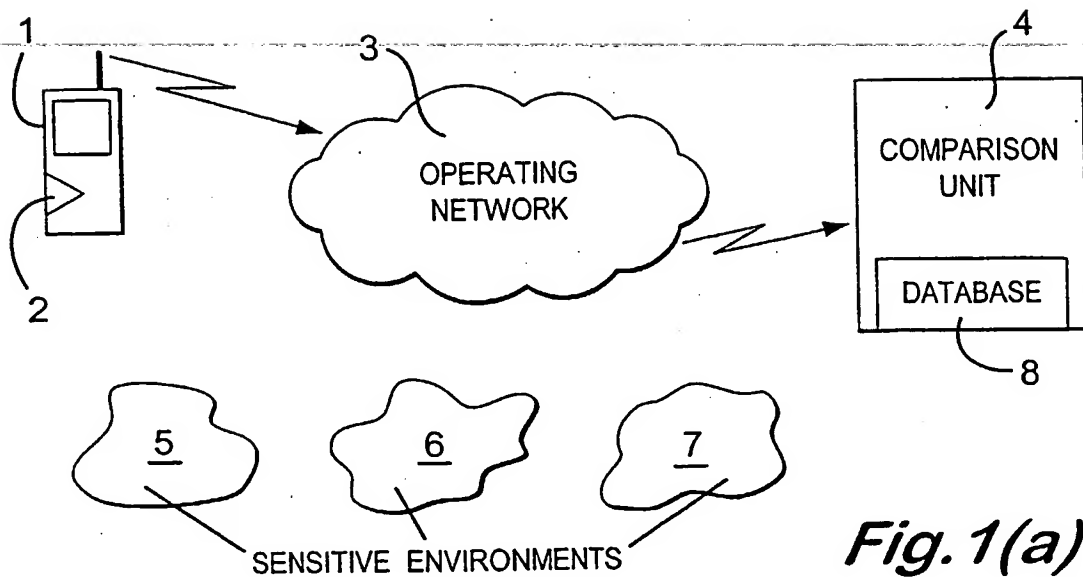


Fig. 1(a)

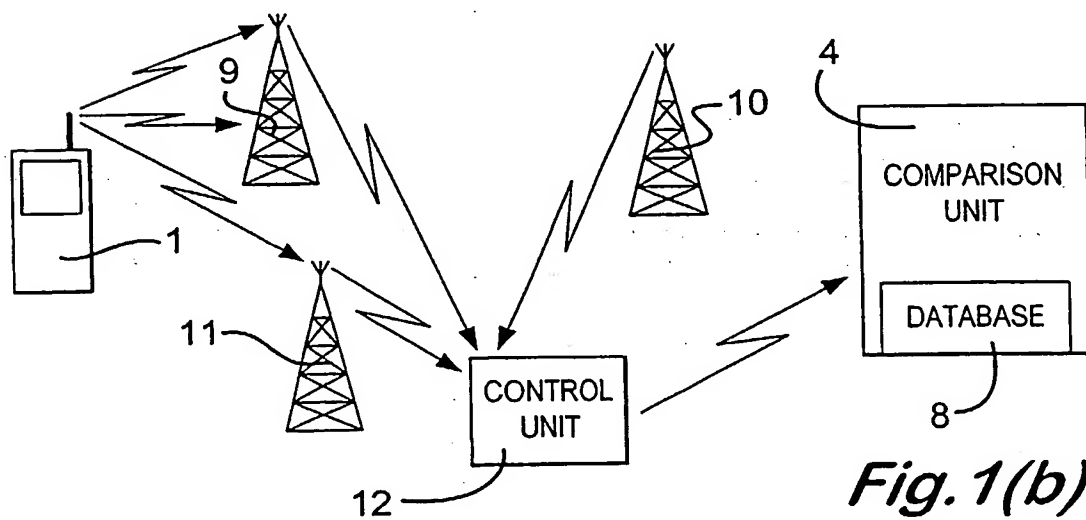


Fig. 1(b)

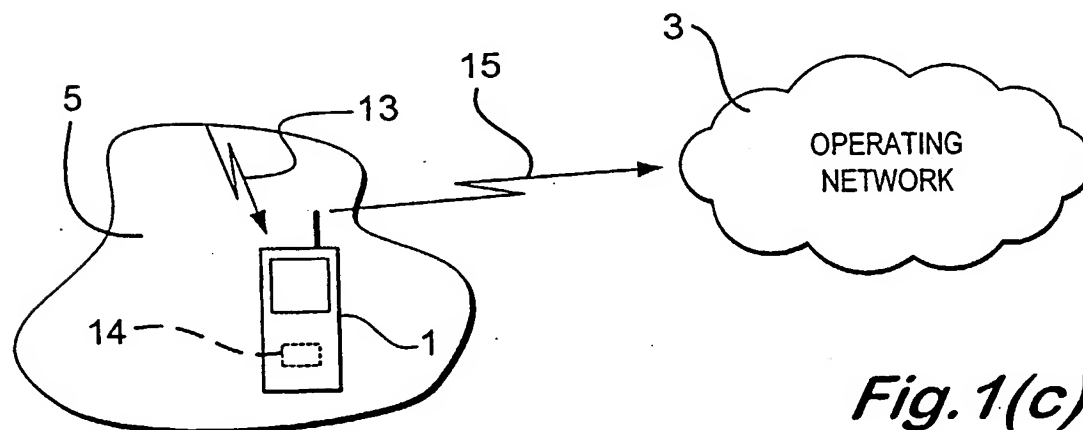


Fig. 1(c)

MOBILE TELEPHONE CONTROL SYSTEM

This invention relates to control systems for mobile telephones.

It is well known that the usage of mobile telephones in certain
5 environments is highly intrusive and there are many circumstances, such as
at musical or sporting events, under which it is socially unacceptable for
users of mobile telephones to receive audible alerts to incoming calls
and/or to conduct conversations over the telephone. Moreover, there are
other circumstances, such as in courts of law and on aircraft, in which the
10 use of mobile telephones does not constitute merely an annoyance, but
may be illegal and/or present a danger to others.

It has proved impossible to impose upon mobile telephone users a
voluntary code of conduct that adequately addresses these problems, and it
is the object of this invention to provide a system which automatically
15 imposes suitable degrees of control upon such users.

According to the invention from one aspect there is provided a
system for automatically controlling the usage of mobile telephones when
they are taken into certain sensitive environments; the system detecting
when a mobile telephone is in a sensitive environment and controlling the
20 functionality of the mobile telephone whilst the telephone remains in said
environment, thereby inhibiting the use or operation of the mobile
telephone in a manner inconsistent with requirements and/or rules
applicable to the environment.

According to the invention from another aspect, there is provided a
25 system by means of which the presence of a mobile telephone within a
sensitive environment is recognised and its functionality automatically

changed appropriately so as to inhibit usage of the telephone in a manner inconsistent with the environment.

In some preferred embodiments of the invention, the functionality of the mobile telephone, when in a sensitive environment, is controlled such
5 that the mobile telephone is completely disabled for so long as it remains in the sensitive environment. This prevents the telephone from being used at all if it is in a sensitive environment.

In one such embodiment, the network supporting the operation of the mobile telephone in question sends a standard response to any callers
10 attempting to reach a telephone whilst it is thus disabled. The network may offer a message service that collects the details of such callers and alerts the user of the mobile telephone of the missed calls once the mobile telephone is clear of the sensitive environment.

In other preferred embodiments, sensitive environments are
15 classified in accordance with their degree of sensitivity and the functionality of the mobile telephone is controlled in accordance with said degree of sensitivity.

In this latter case, and in a preferred embodiment, the system is such that the mobile telephone network detects when a particular mobile station
20 is within, or is entering, a sensitive environment, and whether the circumstances are such that the use of mobile telephones therein is illegal, or otherwise banned, or would merely constitute an annoyance. In the former circumstances, the mobile telephone may be shut down, as described above. In the latter circumstances, however, if a mobile station
25 is called whilst it is in, or approaching, one of these restricted environments, the user will be alerted silently to the call, and will be provided with a text-type message. For as long as the mobile station

remains in the restricted environment, moreover, the user cannot respond audibly to the message. Any response made at that time has to be textual.

Alternatively, the network may merely send a standard response on behalf of the user of the mobile station, and bar all outgoing messages for
5 as long as the mobile station remains in the sensitive environment.

Thus, the system may regard all sensitive areas as requiring the maximum degree of control, thereby providing a single tier configuration, in which any mobile is automatically disabled for as long as it remains in any sensitive environment, or there may be a multi-tiered configuration, in
10 a two-tiered version of which mobiles are disabled whilst in the most sensitive environments, but which retain a degree of operability (though without any audible alerting or message exchanging capability) when in environments of lesser sensitivity. In particular, in the two-tiered configuration, mobile telephones in environments of lesser sensitivity may
15 retain the capability to silently alert their users to incoming calls (e.g. by vibrating), and to receive, and possibly also transmit, silent messages (e.g. of a textual nature).

In any event, there are two major issues to be resolved by the system: namely, (i) detection of the spatial relationship between a mobile
20 and a restricted environment, and (ii) exertion of the necessary control over the functionality of the mobile; the complexity of this latter control function being dependent upon whether the single or multi-tiered configuration is used.

Certain techniques applicable to the resolution of the issues outlined
25 above will be described hereinafter and, in order that the invention may be clearly understood and readily carried into effect, certain embodiments

thereof will now be described, by way of example only, with reference to the accompanying drawings, of which:

Figures 1 (a), 1(b) and 1(c) show, in schematic form, techniques for use in the detection of the spatial relationship between a mobile and a
5 restricted environment.

Whilst there are many potential techniques that could be invoked for detecting the spatial relationship between a mobile and a restricted environment, currently preferred arrangements will now be described with reference to Figures 1(a) to 1(c).

10 Referring now to Figure 1(a), in systems according to this example of the invention, mobile stations such as a mobile telephone 1 incorporate satellite receivers 2 (e.g. GPS receivers), and are capable of transmitting absolute positional information received from the GPS or other satellite system to the operating network 3 within which the mobile telephone 1
15 functions. The network 3 communicates the positional information to computer-based spatial comparison equipment 4, operative on the principles of look-up tables, for example, and capable of comparing the position of the mobile telephone 1 with the spatial co-ordinates of sensitive environments such as 5, 6 and 7 held in a database 8. Coincidence of the
20 spatial position of mobile 1 with the spatial co-ordinates of any of the sensitive environments such as 5, 6 or 7 triggers the application of special control measures to the functionality of the mobile 1, as will be described later.

Referring to Figure 1(b), there is shown an arrangement wherein
25 several base stations 9, 10 and 11 within the operating network are configured to measure the time of arrival of signals from each mobile station, such as the mobile telephone 1. The arrival times of the same

signal from the mobile 1 at the different base stations are communicated to a central controller 12, where their difference is used to estimate the position of that mobile station. The positional information so estimated is utilised in the same way as the positional information derived via satellite as described with reference to Figure 1(a), and may be used alone or in conjunction with the satellite-assisted procedure as described therein.

The arrangement shown in Figure 1(c) operates upon an entirely different principle. In accordance with this embodiment of the invention, a locally-generated, low-power radio signal 13 is broadcast in each of the sensitive environments such as 5, 6 and 7, and mobile stations such as the mobile telephone 1 are provided (as shown schematically at 14) with circuitry capable of recognising the radio signal 13. It is preferred that the low-power radio signal 13 bears characteristics, such as a frequency signature and preferably also a modulation, as by mark-space ratio switching, that render it readily distinguishable from any other signals to which the mobile station may be exposed. In more sophisticated developments, a plurality of such low-power radio signals may be broadcast within or possibly also at or near the approaches to and exits from sensitive environments, and some such signals may have characteristics that differ in accordance with a predetermined pattern so as to indicate whether a given mobile station, such as the mobile telephone 1, is entering or leaving a sensitive environment.

In this embodiment, in any event, the detection of the low-power radio signal 13 may be used locally to appropriately control the functionality of the mobile telephone 1 and/or to transmit an advisory message 15 to the operating network, advising of the whereabouts of the mobile telephone in relation to the sensitive environment. If the required

functionality control is not effected locally (i.e. internally of the mobile telephone 1 itself), then the functionality is controlled by the network.

The technique described with reference to Figure 1(c) is particularly suitable for controlling the functionality of mobile telephones in non-stationary sensitive environments, such as aircraft. In relation to aircraft in particular, the functionality control, effected either locally or from the network, as described above, may consist of an enforced switching off.

A functionality control procedure, based at the mobile station itself, will now be described. In this embodiment, when a mobile station such as the mobile telephone 1 is known to be in a sensitive environment such as 5, 6 or 7, and receives a paging message from its operating network, the functionality is controlled so that a text-type message is stored in the memory of the mobile station for the future reference of the user. This message preferably contains the identity of the caller, the time and date of the call's receipt and any other relevant information, such as an "urgent response" flag. A silent alert, such as a vibration of a component of the mobile telephone itself, or an optional component, such as a thin, flexible plate connected or coupled thereto, may also be employed to alert the user to the attempted call.

In accordance with an optional degree of sophistication, an automated response, or other pre-recorded message, may be relayed to a caller, without the intervention of the user, whilst the mobile telephone 1 is under functionality control.

In an alternative arrangement, the required functionality control is exerted by the mobile's operating network. When the network receives a call for a mobile station which is known to be in a sensitive environment, a text-type message is sent to the mobile station, in this case the mobile

telephone 1 provided that the network has confirmation that the functionality of the mobile telephone is such that it will not respond in an inappropriate way (e.g. by producing an audible alert) to the receipt of the message.

5 Thus a system has been described by means of which the presence of a mobile station within a sensitive environment is recognised and its functionality changed appropriately. In a single tiered system, the functionality control may consist merely of rendering the mobile station inoperative for as long as it remains within the sensitive environment,
10 whilst providing, either locally at the mobile station or remotely, within its operating network, a call log and/or a message minder service within which text-type messages may be automatically received and transmitted.

 In a multi-tiered configuration, the degree of sensitivity of the environment may be taken into account when determining the degree of
15 functionality control required. In particular, in a two-tiered system, mobile stations may be completely disabled when in highly sensitive environments, whilst being permitted to perform and accommodate certain (non audible) functions when in environments of lesser sensitivity.

CLAIMS:

1. A system for automatically controlling the usage of mobile telephones when they are taken into certain sensitive environments; the system detecting when a mobile telephone is in a sensitive environment and controlling the functionality of the mobile telephone whilst the telephone remains in said environment, thereby inhibiting the use or operation of the mobile telephone in a manner inconsistent with requirements and/or rules applicable to the environment.

2. A system according to Claim 1 wherein the functionality of the mobile telephone, when in a sensitive environment, is controlled such that the mobile telephone is completely disabled for so long as it remains in the sensitive environment.

3. A system according to Claim 1 wherein sensitive environments are classified in accordance with their degree of sensitivity and the functionality of the mobile telephone is controlled in accordance with said degree of sensitivity.

4. A system according to Claim 3 wherein two degrees of sensitivity are utilised; the functionality of the mobile telephone being controlled such that, when in environments of the higher sensitivity, the mobile telephone is completely disabled for so long as it remains therein whilst, when in environments of the lower sensitivity, the telephone is rendered able to operate only with non-audible alerting and to be capable of handling only non-audibly transmitted messages.

5. A system according to any of claims 2 to 4 wherein a standard response is sent to any callers attempting to reach a telephone whilst it is disabled.

6. A system according to any preceding claim wherein certain details relating to calls made to a mobile telephone under functionality control are made available to the telephone's user once the mobile telephone is clear of the sensitive environment.

5 7. A system according to any of claims 1, 3, 4 or 5 wherein certain details relating to calls made to a mobile telephone under functionality control are made available to the telephone's user in text-type messages whilst the mobile telephone remains in the sensitive environment.

10 8. A system according to any preceding claim wherein, in order to permit detection of the position of a mobile telephone in relation to the locations of known sensitive environments, mobile telephones incorporate satellite receivers (e.g. GPS receivers), and are capable of transmitting absolute positional information received from the GPS or other satellite
15 system to an operating network within which the mobile telephone functions.

9. A system according to Claim 8 wherein the network communicates the positional information to comparison equipment capable of comparing the position of the mobile telephone 1 with the spatial co-
20 ordinates of said sensitive environments.

10. A system according to any preceding claim wherein Referring to Figure 1(b), there is shown an arrangement wherein, in order to permit detection of the position of a mobile telephone in relation to the locations of known sensitive environments, a plurality of base stations within an
25 operating network for the mobile telephone are configured to measure the time of arrival of signals from the mobile telephone.

11. A system according to Claim 10 wherein the arrival times of the same signal from the mobile telephone at the different base stations are communicated to a central controller, where their difference is used to estimate the position of that mobile station.

5 12. A system according to any of claims 1 to 7 inclusive, wherein a locally-generated, low-power radio signal is broadcast in each sensitive environment, and mobile telephones are provided with circuitry capable of recognising the radio signal.

10 13. A system according to Claim 12 wherein the low-power radio signal bears characteristics, such as a frequency signature and/or a modulation that render it readily distinguishable from any other signals to which the mobile telephone may be exposed.

15 14. A system according to Claim 12 or Claim 13 wherein a plurality of low-power radio signals is associated with one or more of said sensitive environments, said signals having characteristics that differ in accordance with a predetermined pattern so as to indicate whether a mobile telephone is entering or leaving a sensitive environment.

20 15. A system according to any of claims 12 to 14 wherein the detection of the low-power radio signal is used locally by the mobile telephone to appropriately control its functionality and/or to transmit an advisory message to the operating network, advising of the whereabouts of the mobile telephone in relation to the sensitive environment.

25 16. A system by means of which the presence of a mobile telephone within a sensitive environment is recognised and its functionality automatically changed appropriately so as to inhibit usage of the telephone in a manner inconsistent with the environment.

17. A system according to Claim 16, comprising a single tiered system, wherein the functionality control comprises rendering the mobile telephone inoperative for as long as it remains within the sensitive environment.

5 18. A system according to Claim 16 or Claim 17 providing, either locally at the mobile station or remotely, within its operating network, a call log and/or a message minder service within which text-type messages may be automatically received and transmitted.

10 19. A system according to Claim 16, comprising a multi-tiered configuration wherein the degree of sensitivity of the environment may be taken into account when determining the degree of functionality control to be imposed upon the mobile telephone.

15 20. A system according to Claim 19 comprising a two-tiered system wherein mobile stations are completely disabled when in highly sensitive environments, whilst being permitted to perform and accommodate certain non audible functions when in environments of lesser sensitivity.

20 21. A system, substantially as herein described with reference to and/or as shown in the accompanying drawings, by means of which the presence of a mobile telephone within a sensitive environment is recognised and its functionality automatically changed appropriately so as to inhibit usage of the telephone in a manner inconsistent with the environment.



INVESTOR IN PEOPLE

Application No: GB 0026079.4
Claims searched: 1 to 21

Examiner: Glyn Hughes
Date of search: 17 July 2001

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.S): H4L (LDDDM)
Int CI (Ed.7):
Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2344971 A (NEC) see whole document	1,3-7,10-16,18,19
X	GB 2334859 A (ERICSSON) see whole document	1,2,5-11,16,17,18
X	GB 2320164 A (NEC) see abstract	1,2,5-7,12,15-18

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.